IDENTIFYING DATA

Mathematics: Statistics

Subject	Mathematics: Statistics
Code	P03G370V01301
Study programme	(*)Grao en Enxeñaría Forestal

Descriptors	ECTS Credits		Choose	Year	Quadmester
	6		Basic education	2nd	1st

Teaching language	Spanish
Department	Statistics and Operational Research
Coordinator	Iglesias Pérez, María Carmen
Lecturers	Iglesias Pérez, María Carmen
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General description	(*)Esta materia ten como obxectivo proporcionar unha formación estatística básica en descrición de datos, cálculo de probabilidades e inferencia estatística, poñendo o acento nos aspectos aplicados á enxeñaría forestal.

Competencies

Code
C11 Ability to apply knowledge about statistics and optimization. Statistical computer programs of interest in engineering.

Learning outcomes

Expected results from this subject	Training and Learning Results
(*)Purchase the basic statistical training in description of data, calculation of probabilities, statistical inference and optimisation in regression applied to the Forest Engineering.	C11
Know the operation of the editor of scores **Encore	

Contents

Topic	
1. Sampling and descriptive statistics	1.1 Definition and field of application of the Statistics. 1.2 Basic concepts of sampling. Methods of random sampling. 1.3 Descriptive Statistics: Measures of position, dispersion and shape. 1.4 Descriptive Statistics: Tables and graphic representations.
2. Probability	2.1 Random Experiment. Sample space. Events. 2.2 Probability: concept, properties and methods of determination. 2.3 Conditional Probability. Independence of events. 2.4 Fundamental theorems: Product rule, total probabilities and Bayes' rule.
3. Random variables and remarkable distributions	3.1 Concept of random variable (r.v.) 3.2 Discrete and continuous random variables. 3.3 Characteristics of a r.v. 3.4 Models associated to a Bernouilli Process. 3.5 Models associated to a Poisson Process. 3.6 The Normal distribution. 3.7 Other remarkable models.
4. Intervals of confidence	4.1 Estimator: concept and properties. 4.2 The sample mean, sample variance and sample proportion. 4.3 Intervals of confidence for the mean, variance and proportion. 4.4 Calculation of the size of the sample. 4.5 Intervals of confidence for the difference of two means and two proportions.

5. Test of hypothesis	5.1 Definition and classical methodology of statistical testing: types of hypothesis, type I and type II errors, level of significance, critical region. Power.
	5.2 Critical level or p-value.
	5.3 Test on two means and test on two variances (under normality). Test on two proportions.
	5.4 Test chi-square of independence.
	5.5 Normality test.
6. Introduction to regression models	6.1 Linear association measures: covariance and linear correlation coefficient.
	6.2 The simple linear regression model.
	6.3 Least squares and the fitted model.
	6.4 Properties of the least squares estimators and inference.
	6.5 Analyses of variance and sample coefficient of determination.
	6.6 Model checking.
	6.7 Prediction.
	6.8 Multiple linear regression model.
	6.9 Methods for model selection.

Planning

	Class hours	Hours outside the classroom	Total hours
Lecturing	15	15	30
Problem solving	15	15	30
Autonomous problem solving	0	24	24
Computer practices	14	14	28
Supervised work	1.5	10	11.5
Essay questions exam	2	12	14
Laboratory practice	1	7	8
Essay	2	2.5	4.5

*The information in the planning table is for guidance only and does not take into account the heterogeneity of the students.

Methodologies

	Description
Lecturing	Explanation by the professor of the theoretical foundations, which should be studied outside of class. At the beginning of each topic, students will be provided with notes and material for a better follow-up of the class. The CG1 and CE11 competences are worked on.
Problem solving	Classes in the classroom dedicated to solve exercises, and to propose, solve, analyze or interpret problems. The CG1, CE11, CT8 competences are worked on.
Autonomous problem solving	In each subject students should work on a bulletin to know how to solve problems and similar exercises to those in class. It will also be proposed to investigate questions of interest. Also, students will conduct self-assessment questionnaires at the end of the topics or blocks of the subject. All the competences of the subject are worked on.
Computer practices	Management of statistical software by each student. Fundamentally, EXCEL or CALC, and R Commander will be used. In each subject, work will be done on the computer following a script to learn the application, calculation and interpretation of basic statistical techniques. Data files related to the field of Forestry Engineering will be analized. All the competences of the subject are worked on.
Supervised work	The students will organize themselves in work groups to study a case of real data or a simulation. Each group should choose a problem related to the field of Forest Engineering, obtain or simulate data relative to it, describe and analyze them statistically and draw some relevant conclusions. The work will be done mostly outside the classroom, although some parts of preparation and supervision will be in the classroom. Likewise, the presentation of the work will be face-to-face. All the competences of the subject are worked on.

Personalized attention

Methodologies	Description
Supervised work	Each group must attend a face-to-face tutoring (at least one) before the presentation of the work.

Assessment

	Description	Qualification	Training and Learning Results
Autonomous problem solving	The activities (problems, questions, computer exercises) given during the course and the self-assessment questionnaires will be evaluated.	20	C11
Essay questions exam	Written exam of problems and small questions of theory. You have to take a minimum to compensate (4 out of 10).	50	C11
Laboratory practice	Application of statistical software to data analysis in the computer classroom. You have to take a minimum to compensate (4 out of 10).	20	C11
Essay	Score the content and presentation of group work.	10	C11

Other comments on the Evaluation

To pass the subject you must have the two compensable exams and reach a final grade greater than or equal to 5.

In the second call there will be two exams: written and on computer, so that each student retrieves the pending one. The group work and other activities can not be recovered on second call.

Sources of information

Basic Bibliography

Navidi, W., **Estadística para Ingenieros y Científicos**, Mc. Graw Hill,

Cao Abad, R. y otros, **Introducción a la Estadística y sus aplicaciones**, Pirámide,

Peña, D., **Estadística. Modelos y Métodos. Fundamentos**, Alianza Universidad,

Complementary Bibliography

Alea Riera, V. y otros., **Guía para el análisis estadístico con R Commander**, Barcelona: Universidad de Barcelona,

Pérez López, C., **Estadística aplicada : conceptos y ejercicios a través de Excel**, Madrid : Ibergarceta Publicaciones,

Devore, J., **Probabilidad y estadística para ingeniería y ciencias**, Thomson,

Walpole, R. E. et al., **Probabilidad y estadística para ingeniería y ciencias**, Pearson Educación,

Rodríguez Muñiz, L.J. y otros, **Métodos estadísticos para ingeniería**, Madrid : Garceta,

Framiñán Torres,J.M. y otros, **Problemas resueltos de probabilidad y estadística en la ingeniería**, Universidad de Sevilla,

Susan Milton, J., **Estadística para Biología y Ciencias de la Salud**, McGraw Hill Interamericana,

Ríus, F., Barón, F.J., Sánchez, E. y Parras, L., **Bioestadística: métodos y aplicaciones**, SPICUM (U. Málaga),

http://www.aulafacil.com/Excel/temario.htm,

http://knuth.uca.es/moodle/mod/resource/view.php?id=1126,

https://estadisticaorquestainstrumento.wordpress.com/,

Recommendations

Subjects that it is recommended to have taken before

Mathematics: Overview of mathematics/P03G370V01203
Mathematics: Mathematics and IT/P03G370V01103